LOCAL GOVERNMENT
BULLETIN 22

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MINICOMPUTERS

Ontario Ministry of Intergovernmental Affairs

Hon. Thomas L. Wells   D.W. Stevenson
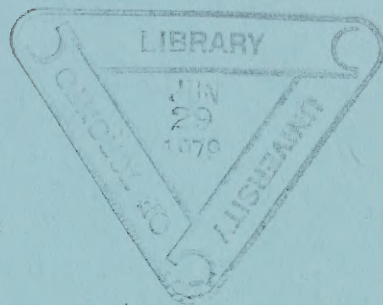Minister   Deputy Minister

Municipal Administration Branch
Local Government Division   March 1979

.To the Municipal Clerk:

Please circulate this bulletin or make
copies for distribution to councillors
or staff of your municipality who may
be interested in the subject. Additional
copies are available at fifty cents each
from the Publications Centre (see page 18).

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INTRODUCTION

In the past decade the use of computers in local
government has increased dramatically, particularly
in the last few years when the minicomputer burst
upon the scene and was hailed as the answer to an
administrator's prayer.

In this bulletin we touch upon the highlights of
the EDP (electronic data processing) environment
in local government, show where the minicomputer
fits, discuss how municipalities might best find
out whether they need one at all and, if so, the
way to get it.

The bulletin does not tell you whether you need a
computer or not, or which one is best for you.
Only you can do that. What it can do is offer
information and guidance that will be helpful if
you are a new user or expect to be involved in the
computer game in your municipality.

GLOSSARY

While we have attempted to minimize the technical
terminology in this bulletin, it is either
impossible or awkward to find substitutes for some
of them. Here is a short list of words you will
encounter with practical definitions.

Application - a specific job, such as payroll

Byte   - a unit of measurement of storage
                 capacity, either in the
                 computer's main memory or in
                 external storage.

CPU   - central processing unit. The
                 heart of any computer, where
                 processing occurs. Performance
                 or capacity is measured in bytes.

Hardware   - the computer equipment, including
                 the CPU, and devices attached to
                 it such as printers, terminals
                 and storage units.

K   - thousand. A measure of capacity

Megabyte   - million bytes.

Software   - computer programs. There are
                 two types of software. System
                 software is generally supplied by
                 the computer manufacturer and is
                 permanently stored in the CPU to
                 operate the computer. Application
                 software are programs that contain
                 instructions for the processing of
                 a particular job.

Software
House   - vendors of prepackaged programs
                 or suppliers of programmers on a
                 contract basis.

WHAT CAN COMPUTERS DO?

With recent constraints, the need for economies has become a strong influence upon municipal decision makers, and the computer offers one possible method of reducing labour needs, and costs, in the future. It can also assist in the information-producing process that is so necessary with the increasingly complex demands placed upon municipal staffs and councils.

Probably the most well-known use for computers is in billing -- tax billing and utilities billing. That is because of the high volumes of data, and the amount of data (name, address, account number) that is repetitive. The computer's high-speed processing of this data, its rapid calculations and printing speeds make it economical for these jobs ("applications", in computer talk).

The second most common use of the computer is for payroll. Here we have a low volume of input (employees, rates, hours) but a lot of different output at various times resulting from this basic information (pay cheques, payments to governments, T-4's, unemployment insurance, pension, departmental cost reports, income-tax reports, time reports). These reports require simple sorting, summarizing and printing operations that are done quickly and easily by computer but are time-consuming for clerical staff.

Both applications, billing and payroll, are often done on other people's equipment -- service bureaux -- and are among the first to be implemented on in-house equipment. They are followed by other accounting-related applications, such as tax and utility receivables, general ledger, budget and financial reporting. For this reason the computer is usually located in the finance department. However, there are many more potential applications for computers, as a number of municipalities in Ontario and else-where have discovered.

Consider, if you will, the following ways in which the computer can directly and indirectly affect the achievement of the delivery of programs and services:

1. Assist support services by improving administrative systems. (council agenda, purchasing)

2. Supply management information to assist delivery of services. (maintenance management, receivables analysis)

3. Achieve cost reductions in admini-
    strative, support, or operational
    systems; and thereby permit more
    resources to be directed towards
    delivery of services. (mailing
    labels, billing)

4. Use directly in operations to improve
    response times and service. (tax
    inquiries, police dispatching)

5. Provide strategic planning assistance
    to decision-makers, such as comparative
    evaluations of alternatives. (modelling,
    forecasts)

6. Generate reports to council and senior
    administrators to assist them in
    managing the municipality. (financial,
    performance measurement)

It has been said that the computer can become a
valuable tool for municipal managers and politicians,
a tool that can help save substantial sums and, in
some cases, lives.

This is not to say that everybody needs a computer
right away, or can necessarily obtain all of the
above benefits soon, if ever. In many cases the
costs are still prohibitive. The actual benefits
differ for each user.

Therefore, each municipal manager must determine
for himself to what extent he can make use of the
computer, and the cost-benefit ratio in his own
case.

WHAT IS A MINI?

Nobody can define a minicomputer with exactitude
or in a manner that is acceptable to everybody.
This is because there is considerable overlap in
types of computers.

Thus, the bottom end of the minicomputer group,
the so-called "micro" computers, overlap the
upper end of electronic accounting machines,
while the upper end of the minicomputer group
overlaps the lower end of the mid-sized computers.
The major difference is power or capacity of the
central processing unit, which indicates the extent
to which human operations can be eliminated, and
the expandability of the computer. These ranges
are marked by sharp price differences.

The illustration below may help you to see more
clearly how the minicomputer fits into the computer
picture. To oversimplify somewhat, the bigger the
box, the more you can put into it.

MINICOMPUTERS

ELECTRONIC
CALCULATORS

MICROCOMPUTERS

SMALL BUSINESS
COMPUTERS

LARGE or MAIN FRAME
COMPUTERS
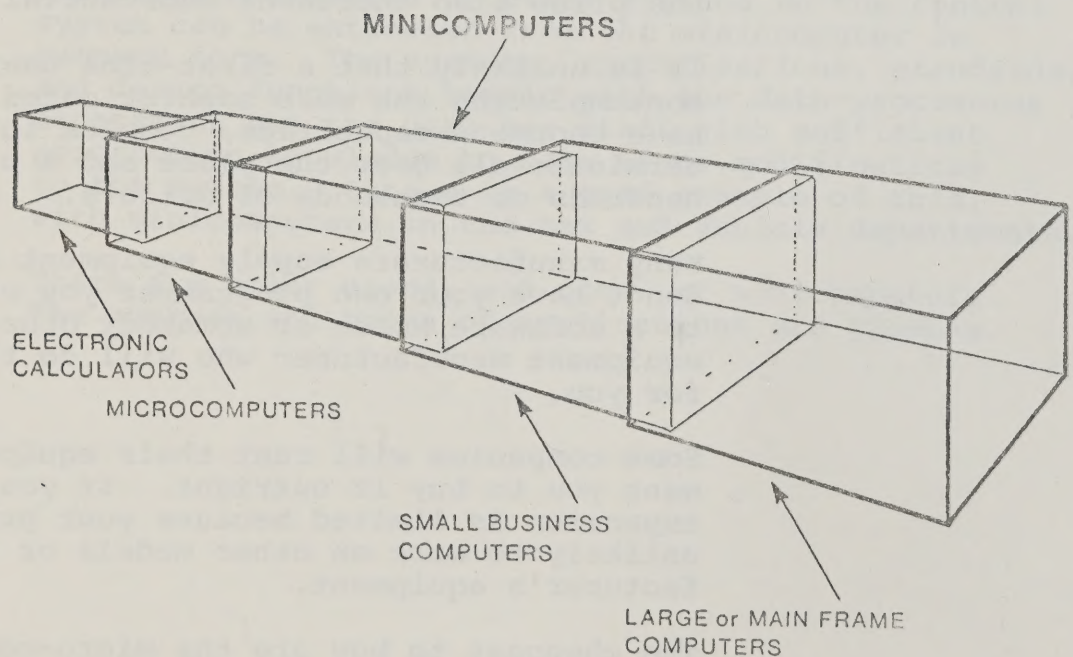
Let us think of minicomputers as relatively small, cheap computers that require no special facilities for installation -- just plug them in. They are programmable, with a language that is easy to learn and use but often time-consuming to code.

The usual method of input is directly by terminal; someone types information on a keyboard. The programs and files are on discs or disc-packs. There is a central processing unit (CPU), console, visual display terminal(s) that resemble TV screens, and a low-speed printer. They handle one job at a time. Because the minicomputer is relatively in-expensive, it is more limited than the large computer (such as slower processing speed). The hardware will do everything the vendor says it will, but you may have to deal with more than one manufacturer since it is not unusual to find one manufacturer making the CPU and others making the various other devices.

In the early days, minis were quite limited in what they could do, and extremely low in cost. However, as demands for increases in capabilities and capacities increased, these limitations ceased to exist, and so did the low cost. Minis are now mini in very little respects except name. They have large amounts of capacity (several megabytes), lots of software, and almost everything can be made available that bigger computers have. Of course, the price also increases substantially.

It is unlikely that a first-time user will be contemplating the more sophisticated systems that have enormous capacities, complex internal software, terminals all over the place and a price in the hundreds of thousands of dollars.

Many manufacturers supply equipment only. If you don't have your own programmer you will have to go to a software house or somebody other than the equipment manufacturer who will do the programming for you.

Some companies will rent their equipment, but most want you to buy it outright. If you grow, your expansion is limited because your programs are unlikely to work on other models or other manu-facturer's equipment.

The cheapest to buy are the micro-computers, but their ability to satisfy municipal needs is untested. Most municipalities to-day are probably considering a purchase price of $40,000 to $60,000 for equipment alone.

MINICOMPUTER USERS AND USES

Despite the limitations described above, the number of minicomputer users is growing steadily. This is primarily because of the low cost and basic uses for which they can be used economically.

One major type of user is the small municipality that has only a few applications. Typically, the minicomputer is used for billing, receivables, general ledger, budgets, payroll and possibly maintenance management. A few other applications are under development, and more will be added as the user becomes more experienced. There is at least one programmer/operator and some of the clerical staff operate the terminals. This is typical of many municipalities in Ontario, such as Orillia and Halton Hills. Although some municipalities expect programming to be added to duties of present staff, that person must be a jack-of-all-trades concerning the computer and will have little time for other matters.

The other major user is a department head who has a large-volume application. Typically, his municipality has a medium to large central computer but the data-processing department head has no desire to expand the central system unnecessarily. The acquisition of the minicomputer for the one department had been completely cost-justified, and any information required by other systems on the central system can be extracted from the minicomputer in summary form. The systems, specifications, standards, and design functions remain with the data-processing department but the user has staff with sufficient programming knowledge to make minor modifications to the system. Ottawa is a good example of this, with minicomputers in the tax and vehicle departments.

There are other users, and uses, of minicomputers. The numbers and types of applications are growing.

WHEN TO CONSIDER A MINI

When to consider acquiring a mini, or any other
computer, is primarily a matter of cost. Here
are some major considerations that might justify
the not-inconsiderable expenditure.

1. High-volume input or output applications.
    This is clearly the case with tax billing
    in many municipalities. Tax billing may
    also be justified because, with so much
    municipal experience in this area already,
    it is often possible to get free programs
    from another municipality.

2. Labour-intensive applications.
    An example of this is the maintenance-
    management system, where a great deal
    of clerical work is required on relatively
    little data. The computer can handle this
    faster and cheaper so that people are
    freed to do other work.

3. Many small applications.
    If there are a number of small jobs that
    add up to a considerable amount of
    clerical time, perhaps some of which
    just don't get done, then it is often
    easy and inexpensive to have the computer
    do them.

4. Regular, timely, relevant reports.
    It is often impossible for a small muni-
    cipality with few clerical staff to
    produce enough regular reports to council
    or for management purposes soon enough
    to be of value. An analysis of accounts
    receivable would fall into this category.
    Yet such reports may often be done by the
    computer as a simple by-product of other
    jobs at nominal costs.

    It is also desirable to have the capacity
    for "exception reporting" where only
    information that is unusual or requires
    action is reported in detail. Such reports
    are cheap to run and are most useful to
    management.

5. Multiple secondary uses of basic data.
    This would include reports to other
    governments and agencies, such as the
    annual financial returns to the province.
    There are also various non-recurring
    requests for information that is already
    in the files and can often be found in
    microseconds by the computer.

6. Rising Costs of Alternatives.
    If the alternatives to getting your own
    computer are costly, then it is worth
    considering in-house facilities. For
    example, service-bureau costs may be
    increasing because you are growing or
    require more reports. Perhaps you have
    accounting equipment that must be replaced;
    a minicomputer might be cheaper. Labour
    costs are rising but you may need more
    staff if you don't automate.

7. Remote location.
    A municipality that is remote from the
    labour market or from service bureaux may
    find it practical to acquire in-house
    facilities.

    The lack of access to labour markets may
    create difficulties in training and
    retaining capable staff, thus making it
    desirable to automate as much of the work
    as possible.

    Remoteness from service bureaux, manu-
    facturers and software houses may severely
    restrict choices, make servicing difficult,
    create unacceptable delays in processing or
    getting results back, or cause programming
    costs to skyrocket.

    The practical solution might well be a
    relatively inexpensive, reliable minicomputer
    with your own programmer.

Remember, these are only factors to consider. Although
one or more of these conditions may exist in your
municipality, it does not necessarily follow that a
minicomputer is the best solution for you. However,
it may mean that you should consider this as a possible
practical alternative that could be cost-justified.

WHAT ARE THE ALTERNATIVES?

There are a number of alternatives to acquiring
your own in-house computer, mini or otherwise.
Here are the major ones.

1. Do nothing.
    It is possible that your best choice is
    to live with your present situation. It
    may be the least of several evils.

2. Add more staff.
    This may be the fastest alternative to
    implement. It may also be expensive.
    Councils don't take too kindly to requests
    for more staff in these days of constraint.

3. Utilize a service bureau.
    This may enable you to automate using
    better equipment than you can afford
    yourself. You may also be able to use
    their programs rather than spend the time
    and money to write your own. One of the
    best things about this choice is that if
    something goes wrong, you don't have to
    fix it.

4. Use another municipality's facilities.
    There are many variations upon this theme.
    For example, you may use another munici-
    pality's computer but have to hire your
    own programmer or operator, or you may
    have to acquire a terminal. Using another
    municipality's equipment is much like
    using a service bureau. Its main advantage
    is that they are in the same business you
    are, and you can use most or all of their
    programs. Its main disadvantage is that
    running the computer for other people (you)
    isn't their main business.

5. Acquire accounting equipment.
    The problem with this option is that the
    cost is usually close to that of a mini-
    computer, without the capabilities of a
    computer. Even the programming can be
    expensive for the newer models. Never-
    theless, there may be a piece of equipment
    on the market that is just right for you
    at a price that is low.

Any of these alternatives may be preferable to
acquiring a computer.

CHOOSING AN ALTERNATIVE

The minicomputer may be the thing you need, but
you won't know until you specify those needs.

One highly recommended method for choosing the
most appropriate alternative for your municipality
is the feasibility study. In general terms, this
feasibility study consists of getting a general
idea of your needs and the costs of meeting them
in different ways.

What you are after is not so detailed as to be
excessively lengthy or expensive, but rather
provides a means of evaluating major alternatives
so that you can pursue one of them in detail.
Remember, the purpose is not to justify a mini-
computer or other form of automation, but to find
the most appropriate method of meeting your needs.

i) Identify the applications that are
most important to computerize, as
well as others that might be desirable
in the future. It will then be possi-
ble to cost these out with various
alternatives, assuming that all of the
jobs must be done somehow.

ii) Visit other municipalities. Talking
to their staff, seeing what they do,
finding out how much it costs and how
they like it, can be done at this stage.
On the other hand, there may be enough
information on hand to make such trips
unnecessary as yet. It is wise to do
so before making your final choice,
however.

iii) Costs. When considering the costs, be
sure to include ALL costs, of EACH
alternative. Thus, the minicomputer
costs include purchase of hardware,
which may run upwards of $60,000 (or
rental over various periods), PLUS the
programming costs that could be as much
or more. Even programs that are already
in operation somewhere else will have to
be modified to fit your needs and equip-
ment. Don't forget the costs of running
the system, of adding programs and main-
taining the ones you will have. Consider
the possibility of hiring a programmer.
Other municipalities and vendors are two
good sources of approximate costs.

iv) Staffing. Each alternative will entail changes in staff or the nature of the work they do. Try to cost out the differences.

v) Payback period. One of the important things to remember is to use a reasonable period of time over which costs should be justified. This is known as the payback period. Although new equipment comes on the market regularly, if you have planned well, there is no really sound reason to expect your equipment to last less than five to seven years, so project all costs (including inflation) over a five year period.

vi) Benefits. The other half of the study considers the benefits. Under some alternatives there are certain advantages that other alternatives do not have, or there may be limitations that should be highlighted. Be sure that they are identified. For example, it may be important to have instantly accessible information at more than one location; if there are no terminals, this may be impossible to achieve or may cost a great deal.

vii) Implementation Period. Each alternative will have a different implemention period. This may be an important factor in your analysis. Allow sufficient lead time for programming, testing and also training your own staff.

viii) Analyses. The result of this work is to produce cost-benefit analyses that can be compared and evaluated. You can then choose the approach that is best for you.

ix) EDP Plan. Before you approach vendors, it is essential to know what you will need over the next five years. There is no reason to expect a vendor to anticipate your needs accurately. If you only tell him part of what you really want, he may give you equipment to do that part at an exceptionally low cost -- but when you need to add other

applications, the hardware and/or software may be inadequate and result in expensive and time-consuming up-gradings. Many municipalities admit that some of their conversions and upgrades could have been obviated by more time in planning. So think twice, and act once!

Your EDP plan should include what applications (jobs) you expect to computerize, and when each is expected to be operative. If not exact dates, at least the sequence of implementation is necessary. The plan will show what you expect the computer to do, and when.

One word of warning.

While you shouldn't feel restricted in what you want the computer to do, asking for too much too soon may increase the price beyond what you are prepared to pay. So be reasonable, and also indicate what is optional as opposed to what is essential, the necessities and the niceties.

This type of feasibility study and EDP plan can be done yourself, or you may wish to engage professional services. If so, ensure you get the best for your job, as outlined in the publication "Getting More For Consulting Dollars".* One of the major problems identified by a recent Local Government Division survey in Ontario, and by an International City Management Association survey in the United States, is management's lack of understanding of the computer environment. It is, therefore, advisable that the municipal manager become personally involved in this exercise -- the more he knows about the general principles, the more his decision-making will be enhanced.

Because the feasibility study includes a cost-benefit analysis of the alternative methods of handling the major applications of the municipality, outside expert resources may be required. However, it may also be possible to get the results of other muni-cipalities' experiences or studies and apply them to your own circumstances. It may even be possible to get the advice of municipal data-processing professionals from another municipality or through their association, the Municipal Information Systems Association (MISA).

* "Getting More for Consulting Dollars: A Guide for Municipalities in Ontario" 47 pages - $3.00 - available from Publications Centre (see p.18).

SELECTING HARDWARE AND SOFTWARE

Technical experts often put together detailed
specifications, and these are certainly useful
to vendors in preparing proposals. You may wish
to hire an expert to prepare a request for
proposal (RFP) for your needs.

On the other hand, as pointed out in ICMA's
August 1978 report, "Using Minicomputers in Local
Government", small minicomputer vendors often do
not have the staff or time to prepare elaborate
proposals. Therefore, if you are certain that a
minicomputer is suitable, you may prepare a simpler
RFP.

Vendors need to know just what it is you plan to
automate, and what you expect the minicomputer to
do. Thus, for each application, descriptions are
necessary that include volume and nature of input,
format and frequency of reports, inquiry requirements,
record and file sizes and inter-relationship and
preferably the implementation sequence.

Since you have already identified what is mandatory
and what would be nice to have, include this too.
Similarly, it is useful for the vendor to have the
ultimate goal of your five-year plan. State whether
you need software and services such as analysis and
programming.

The vendor's proposal should clearly cover how he
proposes to meet your requirements, and the cost.
The proposal should state the configuration of
hardware (what each piece of equipment is and its
specifications) and what software, if any, is
included. If he provides programming services
they should be priced and an estimate given to do
your job. You want to know the cost of purchasing
versus leasing, what the annual equipment-maintenance
contract costs and what it covers. Proposals should
also cover staff training, time and cost. They
should tell you how much free testing you get, and
where.

You need to know something about the firm, too,
such as how long it has been in business, value of
its guarantees, its reputation, who else uses the
equipment they want you to buy, where its service
people are located, what kind of backup is available
in case of equipment failure.

Some vendors supply program packages, but few municipalities find such packages to be satisfactory; therefore, programmers are required to either modify existing programs or to write new ones.

Whoever is doing the programming, whether the hardware vendor or a software house, should supply the same references as hardware firms. They should also give cost and time estimates, state what language will be used, and give names of municipalities that have used their services.

The decision you make is important and long range. It is easier to get into computerization than to get out of it. So, before you make your decision, check out the vendor(s) with municipal users. Go to the municipalities and ask them how they feel about the equipment and software, what problems they may have had and any suggestions as to how you can avoid them. Perhaps they already have programs that you can have for a nominal price. Perhaps you can work with them to develop new applications and share the cost.

Proposals may contain technical language with which you may be unfamiliar. Find out what new terms mean, and what the significance is to you, the user. You may wish to use a consultant, or to take advantage of municipal or other government expertise. In any event, don't be afraid to ask questions and get answers.

If you are able to find or modify a vendor's proposal that you feel meets your needs, notify the losers and negotiate a contract or contracts.

The most important thing to remember in the contract(s) for hardware and software is to spell out each and every point that has been agreed upon between you and the vendor. It is a rare standard vendor's contract that will cover everything you want, because it is primarily designed to protect him, not you. If the vendor's contract can't be modified easily, then draw up your own. It is desirable to obtain advice from your solicitor before signing the contract.

IMPLEMENTATION

The installation of a minicomputer entails all
of the steps required for installation of any
other computer, but some of them are shorter.
For example, site preparation may be as easy as
placing a static-free mat on the floor. This
bulletin will not attempt to deal with implemen-
tation in detail, but will consider those areas
with the greatest potential for problems or
failure.

Before your applications can become operative,
programs will probably have to be modified. In
order to ensure the programmers can do your job
properly, each application must be thoroughly
documented. What was satisfactory for the initial
proposals is wholly inadequate for programming.
Every error or omission entails reprogramming that
is time-consuming and expensive at best.

Make sure all programs are tested with real data
before you accept them, whether they are bought as
a package or custom-written for you. Leave enough
time to train your staff in operating the new
system before you discontinue the old one. Don't
pay for anything until you are satisfied with it.

Because programming is crucial to a successful
system, many municipalities have felt obligated to
hire a programmer or train a member of staff.
This reduces risks of failure considerably as well
as enabling the municipality to respond to changes
quickly. For example, new pay rates, a change in
assessment tape format, or a new reporting require-
ment all entail programming modifications. However,
don't expect a programmer to read your mind and
know all the details of your system. Be prepared
to go over the detailed documentation with him or
her, so you both know exactly what is expected of
the programs.

SUMMARY

- A minicomputer is technically indistinguishable from other computers. For our purposes we have defined it as small, inexpensive, with limited capabilities and direct data input. It has discs and a screen for display, plus a printer.

- Before deciding upon a minicomputer as the most appropriate solution to your problems, check out other alternatives via a feasibility study or cost-benefit analysis.

- Prepare a data-processing plan for your municipality for approximately a five-year period.

- Give a simple and clear description of what you require to vendors. Check out their proposals with other municipalities.

- Detail everything in contracts. Allow sufficient time for implementation - hardware, software, testing, familiarization of staff, operation. Expect more problems with programs than equipment.

- Call in experts if you need them, but don't expect them to know more about your needs than you do.

This bulletin was prepared in the:

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